Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HIROYUSHI SAGO,
SHIGEMI FUJIYAMA,
FUTOSHI SHIMAI,
and
AKIRA UEHARA

Appeal No. 1999-2406
Application No. 08/825,256

HEARD: February 14, 2002

Before GARRIS, DELMENDO, and PAWLIKOWSKI, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 5, 9 through 13, and 16 through 22, which are all of the claims pending in the above-identified application.

The subject matter on appeal relates to a method of coating

a solution (e.g., a photoresist) to a surface of a substrate such as a glass substrate or semiconductor wafer. (Specification, page 1, lines 5-8.) The specification explains that it has been customary to apply a uniform coating of the solution by dropping the solution onto the center of the substrate and then rotating the substrate with a spinner to spread the coating uniformly over the entire surface of the substrate under centrifugal forces. (Id. at page 1, lines 14-19.) However, it is further stated that this conventional method is problematic in that "a large amount of coating solution tends to be scattered off." (Id. at page, lines 20-26.)

Attempts to solve this problem by using a slit nozzle have been made, but the appellants explain that these previous methods are still problematic "because the coating solution cannot completely uniformly be deposited because of the surface tension of the dropped coating solution" and "the solvent in the coating solution tends to be evaporated quickly, making the coating solution more viscous soon." (Id. at page 2, lines 1-23.) Another previous method involves the use of the tip end of a slit nozzle "to uniformize the thickness of a film" (id. at page 2, lines 24-27), but the appellants disclose that "the slit

nozzle is liable to be smeared with coating solution as its tip end contacts the coating solution" and "the coated film tends to become irregular in thickness when the slit nozzle is lifted off the coating solution after the coating solution is deposited..." (Id. at page 3, lines 1-5.)

According to the originally filed specification, these problems are overcome by "ejecting the solution from the slit nozzle toward the surface of the rectangular substrate while reducing the surface tension of the solution..." or by applying forces on the solution that tend to "cancel out the surface tension of the solution..." (Id. at page 3, lines 11-23 and page 5, lines 19-24.) Further details of this appealed subject matter are recited in illustrative claims 1, 2, and 5, which are the only independent claims on appeal, reproduced below:

> 1. A method of coating a solution on a surface of a non-circular substrate, comprising the steps of:
> positioning a slit nozzle above the substrate;
> ejecting the solution from the slit nozzle toward the surface of the substrate so as to minimize effects of surface tension of the solution when the solution is brought into contact with the surface of the substrate;
> translating the slit nozzle parallel to the substrate to coat the solution on substantially the entire surface of the substrate while the solution is being ejected from the slit nozzle without interruption, and while maintaining a tip end of said nozzle out of contact with said solution after the solution is ejected from the nozzle; and
> thereafter rotating the substrate to spread the

solution uniformly over the surface of the substrate.

2. A method of coating a solution on a surface of a circular substrate, comprising the steps of:
positioning a slit nozzle above the circular substrate;
ejecting the solution from the slit nozzle toward the surface of the circular substrate so as to minimize effects of surface tension of the solution when the solution is brought into contact with the surface of the substrate;
rotating the circular substrate at a first speed to coat the solution on substantially the entire surface of the circular substrate while the solution is being ejected from the slit nozzle without interruption, and while maintaining a tip end of said nozzle out of contact with said solution after the solution is ejected from the nozzle; and
thereafter rotating the circular substrate at a second speed greater than said first speed to spread the solution uniformly over the surface of circular substrate.

5. A method of coating a solution on a surface of a substrate, comprising the steps of:
non-uniformly coating the solution on substantially the entire surface of the substrate using a slit nozzle by ejecting without interruption the solution from the slit nozzle toward the surface of the substrate so as to cancel out surface tension of the solution when the solution is brought into contact with the surface of the substrate, and while maintaining a tip end of said nozzle out of contact with the solution after the solution is ejected from the nozzle; and
thereafter rotating said substrate to spread the non-uniformly coated solution over the surface of the substrate under centrifugal forces.

The examiner has not relied on any prior art reference as evidence of unpatentability.

Claims 1 through 4, 10, 11, 20, and 21 on appeal stand rejected under the first paragraph of 35 U.S.C. § 112 "as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention." (Examiner's answer, pages 3-4.) Further, claims 1 through 5, 9 through 13, and 16 through 22 stand rejected under the first paragraph of 35 U.S.C. § 112 "as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected to, to make and/or use the invention." (Id. at pages 4-5.)[1]

We reverse these rejections for the reasons well stated in the appeal brief (pages 10-13) and reply brief (pages 2-7). Nevertheless, we add the following comments primarily for emphasis.

The examiner's basic position regarding the rejection of appealed claims 1 through 4, 10, 11, 20, and 21 based on lack of written description under 35 U.S.C. § 112, first paragraph, is

[1] The examiner has withdrawn "the final rejection of the claims under 35 USC 103(a)." (Examiner's answer, p. 11.)

that these claims "[contain] added material as to the 'minimization' of the surface tension and as to the 'minimization of the effects of' surface tension" and that the "added material" introduces "new matter." We cannot agree.

To satisfy the written description requirement of 35 U.S.C. § 112, first paragraph, the disclosure of the application as originally filed must reasonably convey to those skilled in the relevant art that the applicants, as of the filing date of the original application, had possession of the claimed invention. In re Alton, 76 F.3d 1168, 1172, 37 USPQ2d 1578, 1581 (Fed. Cir. 1996); In re Kaslow, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983). The applicants, however, do not have to describe exactly the subject matter claimed. Union Oil Co. of Cal. v. Atlantic Richfield Co., 208 F.3d 989, 997, 54 USPQ2d 1227, 1232, 1233 (Fed. Cir. 2000), cert. denied, 121 S. Ct. 1167 (2001); Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1566, 19 USPQ2d 1111, 1119 (Fed. Cir. 1991).

As stated in the appeal brief (pages 10-12), the specification, as originally filed, would reasonably convey to one skilled in the relevant art that the appellants had possession of the step of minimizing the surface tension of the coating solution, or minimizing the effects of the surface

tension of the coating solution, in the context of solving the problems described in the specification at pages 1-3. In this regard, the originally filed specification is replete with written description explaining that the surface tension of the coating causes problems in terms of achieving uniformity of the coating (page 2) and that the present invention seeks to overcome this problem by reducing the surface tension of the coating solution with forces tending to cancel out the surface tension of the solution (pages 3-5).

The examiner argues that "the term 'reduction' would merely indicate that the surface tension would be decreased to some extent" and that "there is no indication" in the originally filed specification that "canceling out of the surface tension" could be equated with the term "minimization." (Examiner's answer, page 4.) As stated by the appellants (reply brief, pages 6-7), however, the examiner's argument does not take into account what one skilled in the relevant art would have understood from the entire disclosure. When the originally filed specification is evaluated in its entirety, it is our judgment that the specification would have reasonably conveyed to one skilled in the relevant art that the appellants had possession of the added material.

Accordingly, we cannot uphold the examiner's rejection under 35 U.S.C. § 112, first paragraph, of claims 1 through 4, 10, 11, 20, and 21 as violating the written description requirement.

Concerning the rejection under 35 U.S.C. § 112, first paragraph, of all the appealed claims as failing to comply with the enablement requirement, we agree with the appellants (appeal brief, pages 12-13; reply brief, pages 2-5) that one skilled in the relevant art would not be subject to any undue experimentation to make and/or use the claimed invention.[2] Here, the specification contains explicit direction or guidance on how "to minimize the effects of surface tension" or "to cancel out surface tension of the solution." (E.g., page 5, lines 19-24; page 7, line 10 to page 11, line 23.) This direction or guidance is accompanied by actual working examples and drawings to further enlighten one skilled in the relevant art.

[2] The question of whether making and using the invention would have required "undue experimentation" depends on several underlying factual inquiries including: (1) the quantity of experimentation necessary; (2) the amount of direction or guidance presented; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill of those in the art; (7) the predictability or unpredictability of the art; and (8) the breadth of the claims. In re Wands, 858 F.2d 731, 735, 736-37, 8 USPQ2d 1400, 1402, 1404 (Fed. Cir. 1988).

The examiner's comments with respect to the term "cancel out" (examiner's answer, pages 5-6) are based on an unreasonable interpretation of the claim language in question and are not based on how one skilled in the relevant art would interpret the claims in light of the specification in its entirety.

The examiner also argues: "The specification does not make any provision as to what 'collateral' effects of the surface tension are to be minimized." (Id. at page 6.) The examiner then alleges that "the surface tension itself does not need to be minimized, but instead some unknown features, such as spreadability, viscosity, thickness, etc., which as influenced by the surface tension are to be minimized." (Id.) From our perspective, however, one skilled in the relevant art would understand from a reading of the specification, including the discussion found in the "Description of the Related Art," what the appellants mean by minimizing the "effects of surface tension" and how to achieve such a result.

Accordingly, we also cannot uphold the examiner's rejection on this ground.

In summary, we reverse the examiner’s rejections under 35 U.S.C. § 112, first paragraph, of claims 1 through 4, 10, 11, 20, and 21 as failing to comply with the written description

requirement and claims 1 through 5, 9 through 13, and 16 through 22 as failing to comply with the enablement requirement.

The decision of the examiner is reversed.

REVERSED

BRADLEY R. GARRIS Administrative Patent Judge	)
ROMULO H. DELMENDO Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)

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